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ABSTRACT

This paper focuses on the Purdue University (Indiana) Continuing Engineering Education (CEE) experience in producing distance education over the past 20 years. Discussion includes the role of several educational theories in the formalization of distributed learning; the importance of effective communication in delivery of distance education; redesign of courses and teaching models; the role of the instructor as content expert; and the use of collaborative working environments. A table outlines characteristics of the following necessary components for effective distance education: good communication; technologically astute instructors; effective facilitator or team leader; comfort in use of planning and organizing skills; efficient use of preparation plans and training; flexibility; and experience. (Contains 17 references.) (AEF)

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A Systems Model Approach to Organizing a Distance Learning Program

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Abstract

Problems and concerns associated with the organization of a distance learning program are well documented (Beaudoin, 1990; Clark, 1993; Cummings, 1995; Cunningham, Farquharson, and Hull, 1991; Dillon and Walsh, 1992; Gehlauf, Shatz, and Frye, 1991; Goodwin, 1993; Moore and Kearsley, 1996; Salisbury and Conner, 1994; Schlosser and Anderson, 1994; Sheritt, 1992). Academic institutions wish to capitalize on the process for a variety of reasons ranging from financial and competitive advantage to enhanced delivery of instructional material. Faculty are utilizing the distance education and learning methodologies with increasing frequency. However, faculty are often anxious about the process or unfamiliar with the dramatic difference in assembling a distance learning educational product over one developed for the traditional classroom. This lack of familiarity often results in low motivation to learn about distance education methodologies. Further, lack of familiarity also leads to misunderstanding of the methodologies and of the realities from an academic as well as an administrative standpoint. The challenges provided by these issues prompted the development of this presentation about use of a systems model approach to organizing a distance education program.

Presentation

The presentation for this conference will include a discussion of Purdue University's Continuing Engineering Education (CEE) experience in producing distance education over the past twenty years. Although dating back to the late 19th century and early 20th century, the discussion will focus on the last decade and include recent distance learning outcomes involving the use of a systems model approach incorporating the areas of expertise necessary to offer a successful distance learning environment. The process used by Purdue's Continuing Engineering Education department evolved over a number of years and certainly did not assume a systems model approach. Nonetheless, what is known as a formal model today has been adopted successfully by the facility. Considerable time has been spent coordinating collaborations between and among departments to make this possible. A variety of disciplines and areas of expertise have been necessary to make a distance learning experience a success. This incorporates the faculty as the content expert, but also includes technical specialists, experts in instructional design and graphic design, webmasters, librarians, support staff, administrators, broadcast producers, directors, engineers, as well as student assistants. The type of experts needed will vary with the course, the institutions, and the method of content delivery but the resulting knowledge of other content masters is a more holistic approach to delivering a course that extends the overall learning potential through a more comprehensive effort.

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The proposed presentation will include a discussion of the systems model used to produce a full distance learning course. It will also serve as instructional material for faculty, staff, and administrators wishing to learn more about the organization of distance education and how to put the many components of the systems model in perspective. There will be discussions of techniques commonly found in distance learning environments that can be adapted to extend the scope and functionality of the traditional classroom in incremental ways involving instructional design, pedagogical methodology, evaluation and management followed by a brief interactive case study. The program will conclude with questions and discussion of participants' experience in their use of distance learning methodologies.

The Formalization of Distributed Learning

Educational theories play an important role in understanding the effective use of distance education programs and therefore enhance management's ability to plan effectively when designing distance programs and facilities. Pedagogical, learning, and adult developmental theories have been drawn upon by the theories of distance education as closely related disciplines (Moore, 1972). In his 1972 paper entitled *Learner autonomy: The second dimension of independent learning*, Michael G. Moore expanded the early definitions of distance education pedagogy as

> the family of instructional methods in which the teaching behaviors are executed apart from the learning behaviors, including those that in contiguous teaching would be performed in the learner's presence, so that communication between the learner and the teacher must be facilitated by print, electronic, mechanical, or other devices. (1972, p. 76)

Moore's studies expanded upon the seminal works of Hölmberg (University of Tübingen), Peters (University of Tübingen), and Wedemeyer (University of Wisconsin) integrating concepts promoted by humanistic psychologists such as Abraham Maslow and Carl Rogers (Moore & Kearsley, 1996). Distance education has been viewed as a highly structured learner-centered system. Combined with psychological pedagogy distance education becomes associated with the "theory of transactional distance" (Moore & Kearsley, 1996).

The theory of transactional distance is a holistic, or systems view, of distance education. It is characterized by the growing array of support activities comprising the development of educational programming. At its core is the principle that one instructor can no longer hope to be able to assemble all the technological components of a course single-handedly. In essence, the distance education theorists explain that for a successful distance educational program or course to occur it must be the effort of a team of many content experts. In this developmental process the instructor is one of a number of experts (Moore & Kearsley, 1996). Moreover, in a learner-centered approach the instructor is no longer the focus but instead an expert facilitator of the course content.

Part of the transactional distance (or the psychological separation of course from students) is the greater need for balance between structure and dialogue. Behavioristic in origin, the increased emphasis of learner autonomy was once seen as an annoyance. As a result of more recent research this is beginning to be seen as a cognitive choice by the learner, as well as the instructor, in the form of personal learning and instructional styles (DeNigris, 1996).

Research is demonstrating that the propensity for individuals to interact in a distance program varies. These differences play important roles in the successful use of distance education methodologies as well as in the planning and administration of delivery methods, age, personality and cognitive/learning styles and are important factors (Kearsley, 1995). The level of interaction needed by students may vary depending upon their ability for self-direction or autonomous behavior. Kearsley cites professionals and executives as generally in need of less interaction and children in need of higher levels of interaction (1995).

More recent on the scene of educational technology and distance education are the theories of human-computer interaction as part of the field of human factors specialties. Two researchers stand out in the field of research in the design of technological artefacts. Of the early human factors specialists Donald Broadbent has pioneered the subject of human interaction with 'everyday' things but with extreme views not always well received by his colleagues (Colbourn, 1995). Colbourn (1995) considers Donald Norman's case-study approach less scientifically rigorous "but no less rich in production or information." According to Christopher Colbourn (1995) both researchers represent the opinion growing in support that it is no longer thought humans should adapt to technology but that technology itself must change to better address human needs and functions. While this view is becoming more widely adopted, it is still moving at a slow pace as the emerging research takes time to filter through the actual industry production process of technology products.

Also important today is an understanding of the evolving constructivist theories of mental modeling and analogic thinking, metaphoric/analogic thinking, schema theory knowledge structures, metacognition, metadata, imaging, and the information processing model of cognition. An understanding of current research is as necessary as an understanding of new and evolving technologies to prepare decision makers with the ability to make quick and accurate decisions required for institutions and their workforce in a rapidly changing world.

Looking at the specifics of delivering education at a distance the literature recognizes specific components as necessary for the distance education environment to work effectively and come alive as noted in Table 1.

Although the desired characteristics sought for the traditional classroom instructor are also those for someone teaching at a distance, it takes a creative mix of components to actually draw in the students from a remote, independent environment and make them feel a part of the process and community. Regardless of personal learning style or level of motivation the highest priority of these components is *good communication*. When working at a distance, without communication the rest falls apart.

As a result of research, new technologies, and the rapidly changing face of technology, education, and the workplace,it has become necessary for educators to reconsider how to deliver course content to students. Time alone will not allow learning all the new educational applications and practices, but relying on the expertise of many content experts will help ease the burden of keeping pace with change while still delivering quality education. The old 'factory style' business model of Frederic Taylor's scientific management approach has long since outlived its usefulness in our workplace. Thus, the classroom needs to be updated to reflect changes in society (Oblinger and Maruyama, 1996).

It should still remain the responsibility of the instructor to serve as the content expert. In this role the educator determines the direction of the course while operating as project manager during the development process. Remembering to let the subject matter of the course, not technology, determine course direction is an important issue to consider. A team of other content experts can help during this developmental phase. A team of content experts has been found useful in areas such as technology platform selection, multimedia use, design of graphics, animation, film clips, web development, software programming, pressing compact discs, producing slide presentations.

Table 1. Necessary Components for Effective Distance Education

Good communication:	Clear objectives Regular feedback Close attention to all communication
Technologically astute instructors:	Aware of new coaching/counseling skills to guide independent learning experience and anticipate the need for intervention. Utilize formal or informal systems to free instructor to focus on content and students through use of multiple content experts.
Effective facilitator or team leader:	Coordinate process of group work allowing instructor to focus on content and students.
Comfort in use of planning and organizing skills:	Eases creation of sufficient structure, delivery and flexibility with technologies.
Efficient use of preparation plans and training:	Enhanced through use of continuous professional development programs to keep pace with technological and pedagogical changes.
Flexibility:	To better deal with change and ambiguity.
Experience:	Necessary components for the traditional classroom are also desirable qualifications of distance education instructors: Enthusiasm Genuine concern for student Understanding of subject matter Fairness (Lawton, Papineau, Ramage, 1996)

Lest you think this approach extremely expensive, consider the numbers of departments involved in each of these areas already housed on most university campuses today. Just as the business community is moving in the direction of more collaborative work environments and team efforts, the foundation to the systems model is already in place in most institutions of higher education. Establishing and nurturing these collaborations is key to the success of the systems model and the focus of this presentation. The strengths and weaknesses,

successes and failures of utilizing a loosely-formed systems model by Purdue University's Continuing Engineering Education distance education facility will be discussed.

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Autobiographical Sketches

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